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TEXT AND IMAGE IN TRAFFIC SIGNS

While most traffic signs in Europe are purely pictorial, some also employ text. The article discusses two-code (image plus text) traffic signs on examples from a few countries: the UK, Germany, the US, the Netherlands, France, Belgium and Poland. Special emphasis is placed on various possible sense relations between text and image in such signs. In some of these relations (such as intersemiotic translation or emphasis) the text does not modify the meaning of the image, whereas in others (such as restriction, complementation or elaboration) it does. Drivers who do not know the local language, however, are neither able to understand the text nor to determine its function towards image. Therefore, the text is always prone to affect them negatively.

1. Introduction

Judyta, a woman of about 40, the main character in a series of bestselling novels by Katarzyna Grochola, travels by car to Germany for the first time, with a friend. Just after the Polish-German border Judyta notices the popular German sign saying *Ausfahrt* ('exit'), which she interprets as a town name. As they drive further towards Berlin, Judyta sees similar signs over and over again and becomes nervous. Finally, she orders her friend to stop on the hard shoulder and scolds her: "[...] you've been driving in a circle for an hour and a half already! When we entered Germany, we were one kilometre from *Ausfahrt*, and now we are seven kilometres from it [...]" (Grochola 2002: 53-54, translation by MB). This humorous episode is in fact fairly realistic, as the same traffic sign is sometimes used for a similar joke by Polish commercial drivers. When accompanied by a less experienced colleague who has never been to Germany before, a seasoned driver will often try to make the greenhorn believe that *Ausfahrt* is a town name. By the same token, independently of his actual destination a newbie behind the wheel in the UK can expect to be told to drive in the direction of Slow, which is a play on a very frequent road marking associated with a hazard and normally accompanied by an upright warning sign.

The problem of similarities and differences among traffic signs and rules of the road in various European countries first attracted my attention thanks to my Polish coach driver friends. Knowing me to be a polyglot, they started to ask me numerous questions about the meaning of certain textual elements in traffic signs which puzzled them, for example about the plate reading *IN CASA DI NEBBIA* ('in case of fog') placed below the sign imposing the speed limit of 50 km/h on the motorway near Venice, where everybody was doing at least 100 km/h on a nice summer day. Although my friends tend to overestimate my expertise in foreign languages and especially the number of languages I speak fluently, my good knowledge of English and German plus some scraps of French, Latin, Portuguese and Dutch are, more often than not, enough to answer such questions to their satisfaction. However, I began to wonder how problems in understanding foreign traffic signs and rules of the road might impair safety on the road.

As textual input in traffic signs is supposed to be simple, possible comprehension problems experienced by drivers from abroad may not be so obvious for inhabitants of countries where at least basic knowledge of a few foreign languages is commonplace, such as the Nordic countries. However, in the case of Poles, and especially those belonging to the older generation who finished their education before 1989, knowledge of EU languages other than Polish is hardly to be expected even from people who graduated from universities. As reported by Mejer et al. 2010, the recent Adult Education Survey carried out by Eurostat in 29 EU, EFTA and candidate states between 2005 and 2008 showed that more than one third of the population did not know any foreign languages. Self-perceived foreign language skills differ considerably among inhabitants of various countries. Generally, knowledge of foreign languages tends to be much better in countries with a small population. Over 50% of the population report they know two or more foreign languages in Norway, Slovenia, Slovakia, Finland, Lithuania, Estonia, Latvia, Denmark, Sweden and Belgium. The worst results were obtained for Hungary, Portugal, Spain, Bulgaria and Greece, where the highest shares of the population (between 43% and 75%) speak no foreign languages at all. It must also be noted that in post-communist countries the foreign language reported as the most popular by the older generation is Russian rather than any EU language.

Over time, the situation will probably improve to some extent due to the strong promotion of multilingualism by various EU authorities (see e.g. Wodak 2010), which results in increasing both the share of schoolchildren learning foreign languages from an early age and the number of foreign languages taught at schools. Trilingualism of EU citizens has repeatedly been declared as an essential goal. However, the present level of foreign language skills must have negative implications on European drivers' ability to comprehend textual traffic signs all around Europe. Moreover, taking into consideration the sheer number of official EU languages and the fact that some of them (e.g. Hungarian, Finnish) are unrelated to the Indo-European majority, and some (e.g. Greek)

use an alphabet other than Latin, even knowledge of two foreign languages is not sufficient for a driver to be able to decipher textual messages in all EU countries.

The main goal of this article is to discuss various sense relations between image and text in existing traffic signs (focusing primarily on European ones), with some speculations how these relations might affect comprehension of two-code signs by both local and foreign drivers.

2. Literature review

Traffic signs have been the subject of extensive research in three realms: psychology, history, and semiotics (sometimes overlapping in a single, interdisciplinary study; for example Krampen 1983 combines a semiotic approach with a detailed diachronic analysis). While historical accounts seem of little relevance for my topic, I will focus on the other two.

2.1. Psychological studies

Psychological research has been the most abundant so far, and addressed a wide range of issues, such as mental representation of traffic signs (e.g. Castro et al. 2005) or reasons for drivers' failure to comply with them (e.g. Gardner and Rockwell 1983).

Since 1970s, the use of text versus pictures in traffic signs has been assessed in a number of studies within the framework of cognitive science. An overview of these studies is presented in Horberry et al. 2004. Whereas it is obvious that pictorial signs have the advantage of being understandable also for drivers who do not know the language of the country they are driving in, some other important advantages were revealed. Therefore, the view that pictures are superior to text has become prevalent.

Jacobs et al. 1975 investigated the distance from which drivers were able to read pictorial and textual signs. In their field study, carried out under good, daylight driving conditions, they asked the subjects to drive at a specified speed towards signs that were placed beside the road especially for the experiment (16 existing Australian signs, half warning and half regulatory, for each type four signs were pictorial and four were textual). The subjects' task was to verbalize the message on the sign as soon as it became visible. The researchers determined that the average legibility distance was twice longer for pictorial signs. These results were later corroborated in a number of laboratory studies, e.g. Kline et al. 1990 and Long and Kearns 1996. The former confirmed that better visibility of pictorial signs was valid for drivers from three age groups (young, middle-aged and elderly), and additionally showed that the difference in favour of pictorial signs was even more pronounced at dusk. However, out of four pairs of textual and pictorial counterparts (American warning signs), one pair containing signs

for a steep hill (*HILL* vs. a picture showing a truck driving down a slope) showed similar visibility distances for both the signs.

As legibility of traffic signs might not necessarily be correlated with their comprehensibility, and both are prerequisites for the driver to react correctly to the sign, research has also been carried out to test comprehension of pictorial and textual signs measuring reaction times to both sign types. For example, Ells and Dewar 1979 report two laboratory experiments in which the subjects were exposed to yes/no reaction time procedure. The first experiment involved slides of the same set of traffic signs as used by Jacobs et al. 1975. Before being shown each sign, the subject listened to a verbal message corresponding, or not, to the meaning of the sign. When shown the sign, the subject was to react as quickly as possible and decide whether the verbal message and the message conveyed by the sign were the same or different. In the second experiment, 14 pairs of existing Canadian regulatory and warning signs comprising textual and pictorial signs with the same meaning were used. Reaction times were measured for normal and degraded visibility. In the latter case, the subjects were required to wear goggles whose effect was comparable to difficult road conditions: fog, darkness and glare from the headlights of an oncoming car. In both the experiments, pictorial signs accounted for shorter average reaction times than textual signs. However, in the second experiment not all textual signs were processed longer than their pictorial counterparts (two short, four-letter messages, *HILL* and *BUMP*, being notable exceptions to the general trend). In addition, restricted visibility affected the comprehension of pictorial signs less severely than of textual signs.

The superiority of pictorial over textual signs as regards both their legibility and comprehensibility was further confirmed by MacDonald and Hoffmann 1991, reporting a series of carefully designed field and laboratory experiments. This study additionally shows that pictorial signs tend to be more conspicuous, i.e. there is a greater probability that they will be noticed by drivers in the road environment, which is complex and obviously, beside traffic signs, displays numerous other sources of useful information as well as potential distraction.

Not all studies, however, have yielded results in favour of pictorial traffic signs. For example, in a study investigating drivers' preferences, Robertson 1977 compared six textual and six pictorial versions of a new sign to be introduced: a warning against too short following distance. The subjects clearly preferred the textual versions over pictures. This should probably be taken into consideration when designing new traffic signs. Although learner drivers can become acquainted with such signs alongside with more traditional ones, drivers who already possess a driving licence generally are not required to take any refresher courses (with some exceptions, e.g. commercial drivers or drivers who received a certain number of penalty points for traffic offences). Thus, the majority of active drivers can only be reached with information on new road signs (and new traffic regulations, too) by means of the mass media, which is not guaranteed to be effective. Consequently, drivers will sometimes encounter unfamiliar traffic signs whose meaning they will have to decipher on their own.

The general superiority of pictorial traffic signs was also challenged by the results obtained by Castro et al. 2007. While the study did not focus on comparison of textual and pictorial signs, but rather on possible priming effects obtained by placing two signs one after another, it also revealed that the effectiveness of pictorial signs depends on the function of the sign. The study employed British road signs in two formats, i.e. pictorial and textual. The former proved more effective (in terms of reaction times and accuracy of recognition) for warnings, but not for indications. This result is attributed partly to the fact that it is a common tendency in the UK to use text rather than pictures for indication signs, so the subjects' performance in the experiments might be related to their more extensive previous exposure to worded indication signs.

Taking into account all the advantages and disadvantages of each type of signs discussed above, one could decide on setting off some of the disadvantages by combining text and picture in a single sign, which is advocated, for example, by Edworthy and Adams 1996. However, while this solution might be fully justified in relation to some other types of signs, such as warnings placed on product packages, the specific conditions under which traffic signs are processed (numerous concurring mental and physical tasks, time pressure) must raise some doubts related to possible information overload. As pointed out by Horberry et al. 2004, the results of studies investigating the simultaneous use of pictures and text in traffic signs are contradictory and therefore inconclusive. Some studies (e.g. Avant et al. 1996) have indicated that combining two different codes (i.e. pictures and text) in one sign produces longer reaction times and less accurate comprehension. Other studies, on the contrary, have shown shorter reaction times for such signs as compared with those using only one code (e.g. Koyuncu and Amado 2008).

Research on mixed-code road signs has been carried out, so far, only with subjects who were native speakers of the language used in the signs. The impact of such signs on drivers who do not know this language, therefore, has not been assessed. It is reasonable to speculate that in such a case comprehension of the sign is not enhanced in comparison with its pictorial counterpart. However, it could also be significantly hindered, as admitted by the authors of the abovementioned study. Moreover, what about drivers who know the language imperfectly? While drivers who are fully unfamiliar with the language might simply disregard the textual elements and treat the signs the same as pictorial ones, drivers with partial command of the language might devote much more attention than native speakers to the text in an attempt to understand it.

Thought-provoking insight into processing of text (not accompanied by pictures) displayed on Variable Message Signs (VMSs) is offered by Anttila et al. 2003 and in particular by Jamson et al. 2005. The former discusses a field experiment employing eye-tracking, in which Finnish drivers read one-word VMS with Finnish and Swedish versions alternating or presented simultaneously. The presentation mode did not make any significant difference, but the results may suggest that processing of bilingual signs requires much more time than of monolingual signs (although monolingual signs offered different type of infor-

mation, which might enhance their processing). The latter describes a driving simulator experiment in which monolingual (English) and bilingual (English/Welsh) drivers were confronted with monolingual and bilingual signs of various lengths while driving on a virtual motorway. One- and two-line signs (whether monolingual or bilingual) were read without disruption to the subjects' driving behaviour. However, reading four-line signs resulted in noticeable speed reductions as well as shortening the headway to the vehicle in front when it slowed down, both behaviours likely to increase accident risk. In addition, some of the signs included an instruction in the last line to be carried out by the driver in order to ascertain his or her comprehension of the sign and measure the reaction time. The rate of correct response to the instruction fell from 99% for one- and two-line signs to 86% for four-line signs. Response times increased by only 16% when the number of lines rose from one to two, however, they doubled when the number of lines rose from two to four. These results are in line with previous research suggesting that drivers travelling at motorway speeds are not able to effectively process more than eight words in a single sign.

Interestingly, the experiment revealed that both monolingual and bilingual four-line signs (in which half of the message is in fact redundant for any driver) produced a similar distraction for bilingual as well as monolingual drivers, the effect of bilingual signs being even more pronounced (lasting longer). These results strongly suggest that drivers are making effort to read the part of the message that is irrelevant or incomprehensible to them. The authors of the study suggest limiting the distraction by using separation techniques such as a line dividing the two language versions or different colours of font, while admitting that the former, which they also tested, was not helpful to their subjects.

Although the authors play this down, their results actually constitute a powerful argument against using four-line VMSs, bilingual ones in particular. Especially the use of bilingual, excessively long VMSs for purely political reasons (as is the case in Wales, where all drivers understand English) seems questionable. It may be seen as satisfying the calls for cultural and linguistic diversity at the cost of compromising road safety. Also the use of monolingual four-line VMSs raises serious doubts. Such messages should probably simply be avoided, and this could be accomplished through a combination of many methods, including omission of information which is not highly relevant, succinct formulation, employing pictures to express part or whole of the message, etc.

2.2. Semiotic studies

In 1970s and early 1980s, a few articles focussing on traffic signs appeared in the journal *Semiotica*: Studnicki 1970, Droste 1972 and Krampen 1983. While the first two are relatively brief, Krampen 1983 is a very comprehensive study, over two hundred pages long, published as a special issue of the journal.

Studnicki 1970 discusses traffic signs as a language conforming to the rules of formal logic, consisting of normative clauses (by which certain behaviours are

commanded, prohibited or made optional) and of descriptive clauses (warnings and information). This language possesses its specific vocabulary, syntax allowing for composition of complex units, and semantic rules enabling comprehension. In his discussion, Studnicki does not differentiate clearly between rules of the road as they might be expressed in a traffic code (e.g. "Pedestrians should keep to the left side of the road") and traffic signs as such (e.g. "Priority on the narrow section of the road"). He does not refer at all to the form traffic signs take, e.g. pictorial or textual.

Droste notes that, although the surface manifestations of pictorial traffic signs clearly differ from these characteristic of natural languages, the signs also have an underlying structure enabling them to be seen as "sentences of a typically linguistic structure" (1972: 257). He analyses traffic signs in accordance with the rules of generative grammar. Each sign, therefore, contains a modal operator belonging to a finite set (FORBIDDEN / ALLOWED / ATTENTION / DANGER / OBLIGATION) and a proposition (a topic and a comment, whose presence is optional and which may also be specified further). Droste proceeds to present a traditional phrase marker tree that can be used to represent the deep structure of traffic signs.

Krampen 1983 sees a particular traffic situation as the signifier, whereas the road sign or the traffic code regulation corresponding to this situation is the signified. He stresses "the interaction of technical progress and iconic representation", according to him, "with the increasing speed of traffic, the changes in traffic signs inevitably move in the direction of a simplification and schematization of these icons" (1983: 20-21). He sees the emergence and diachronic development of road signs as a typical process of semiosis, in which conventional verbal signs are gradually replaced with iconic signs. The main factor causing the semiosis to take this direction is the need to express messages above the barriers of natural languages (1983: 31). These observations are valid for the European system, which became the basis for the international system sanctioned by the conventions of the League of Nations and later of the United Nations Organization. The American system, on the other hand, has developed in a different direction and it uses mainly conventional signs in the English language (1983: 104). The discussion of pictorial traffic signs as a successful, universally comprehensible iconic code leads to a proposal for a global sign system covering a wider range of realms than just road traffic.

Apart from semiotic studies devoted specifically to traffic signs, as Krampen rightly points out, "different systems of road signs are quoted again and again in semiotic literature as examples of typical sign systems or of special semiotic problems" (1983: 21). For instance, Jakobson 1960 described the fixed sequence of green, yellow and red lights as a grammar of traffic signals. More recently, traffic lights were discussed in much detail by Johansen 1993. Johansen & Larsen, in their *Introduction to Semiotics*, classify Danish traffic signs by means of a digital structural code as belonging to four distinct types (warning, prohibition, positive injunction and guidance) and show how shape and colour can represent

content (2002: 47-48). They do this in order to explain de Saussure's views on arbitrariness of symbolic signs. Scollon & Wong Scollon use the 'one way' sign as an example of the phenomenon of emplacement: the sign makes sense only when placed in a relevant physical location, i.e. alongside the road to which it applies (2003: 114-115).

3. Sense relations between text and image in two-code traffic signs

So far, researchers dealing with two-code traffic signs have failed to indicate that such signs display a variety of relations between text and picture, which might have important implications for their comprehension by drivers knowing the language, those not knowing it at all and those having only partial command of it (possibly different for each of the three groups). My aim is to attempt a comprehensive description of such relations, with the hope that future cognitive studies on the topic will do justice to their complexity.

Possible relations between picture and text have been studied extensively from the semiotic perspective, but mostly in relation to works of art (e.g. Schapiro 1973). An overview of selected literature dealing with such relations is presented in Sarapik 2009, where the term "imagetext" is employed to refer to items in which image and text occur side by side, such as comic strips. Traffic signs containing text also fulfil the definition of imagetext. Sarapik underlines that it is impossible to create a clear-cut taxonomy of imagetexts, as "picture-word relations are too heterogeneous; they have too many transitional forms, intermediate stages, and possibilities to try and classify them fully and distinctly" (2009: 285).

A valuable taxonomy of relations between picture and text based on the functions the former perform towards the latter is offered by Marsch and White 2003. This taxonomy does not focus on works of art, but is meant to be applicable to all types of documents in which pictures and text interact. It is developed in two stages. First, the authors analyze previous research dealing with image-text relations in various areas: children's literature, lexicography, education, journalism, and library and information design in order to determine and list the various functions of picture towards text that were established. Then they try to apply the resulting preliminary version of the taxonomy to 954 image-text pairs from 45 websites, consequently adding a few further functions. The final version of the taxonomy identifies 49 functions grouped in three categories according to the closeness of the relation between picture and text.

The hierarchy of functions is complex, with several more general subcategories comprising a number of individual functions. The category of functions expressing little relation to the text includes, among others, the subcategories of decorating and eliciting emotion. Functions expressing close relations to the text (the most numerous) include reiteration, organisation and explanation of textual

information. Functions going beyond the text include interpretation, development and transformation of textual information.

Obviously, only some of 49 functions identified by Marsch and White 2003 are applicable to such a limited area as two-code traffic signs, but their taxonomy can constitute a good departure point for analysing such signs. It must be noted that this taxonomy presupposes that text plays a superior role, however, we can also assume that most of the same functions can also be performed by text towards picture.



Figure 1: A German warning sign with additional text.

At the most basic level, it is possible to describe the hierarchy between text and picture. One of them can be dominant, or there can be an equal relationship between them (Sarapik 2009). For example, in the German traffic sign in Figure 1 the text ('trains going again!!') only emphasises the warning for those drivers who might have got used to the fact that for some time the railway crossing was disused. The textual part, however, is not essential to produce the desired behaviour in drivers, and neither is it standardised through presence in the official list of German traffic signs.

Figure 2 shows an American traffic sign, of the type that has been employed in psychological experiments comparing textual with pictorial signs. Researchers have failed to note that hardly any (if any at all) of the "textual" signs compared with pictorial signs in experimental studies were, in fact, purely textual. Although the text is indispensable for the driver to understand the sign and act accordingly, also the shape and the colours of the board, the frame and the letters have a distinct meaning, i.e. 'warning'. Moreover, they make the sign more

prominent in the road environment and distinguish it from other objects, such as shop advertisements. Therefore, this sign should be considered as a combination of text and picture in which the text clearly dominates.



Figure 2: A typical American warning sign.



Figure 3: British regulatory signs.

In practice, the hierarchy between text and picture may be very difficult to determine for some traffic signs. Let us consider the British 'give way' and 'stop' signs (Figure 3). Seemingly, they are very similar to each other. They are both among the most important regulatory signs, and this is reflected by their unique shapes shared by no other sign (this way, they can also be recognized from behind by drivers on the major road, and they remain recognizable even if their visibility is degraded, for example by sticking mud or snow). The shape and colours can be described as the pictorial part of each of these signs, and this part (actually, even the shape itself) is sufficient for the driver to recognize the sign. Therefore, one would be tempted to state that the picture dominates in both of them. The text in each of these signs, however, also represents the whole meaning carried by the sign. Consequently, maybe there is an equal relationship between the two parts?

However, in spite of all the similarities, these two signs might not exemplify the same hierarchy between the pictorial and the textual elements. Let us consider that the 'give way' sign does not carry any textual message in most other

countries, while the ‘stop’ sign does (either the same word as a borrowing from English, or the local counterpart). This fact encourages the conclusion that the pictorial part is more clearly dominant in the former sign than in the latter. It may be further confirmed by the road markings corresponding to each of the upright signs: the double dotted line for ‘give way’ is accompanied by the drawing of an inverted triangle, whereas the wide, single continuous line for ‘stop’ is accompanied by the text *STOP*.

The relations between text and picture can also be described and differentiated in terms of the functions the two parts play towards each other and for the sign as a whole. Probably the simplest of those relations is “translation”, understood more widely than mediating between two verbal means of expression, what is meant here is intersemiotic translation from verbal message to conventionalised picture and the other way round (cf. Gottlieb 2005). In a sign of this type, words and picture do not necessarily have to possess an equal status, but they express the same content, as in the British ‘give way’ sign shown above in Figure 3. If we consider the sign and the accompanying plate as a single entity, the French ‘give way’ sign is very similar to the British one, the text *CEDEZ LE PASSAGE* being added on the plate below the sign rather than inside the triangular board (in this way, the text is probably given less prominence). Intersemiotically translated signs¹ are the type of sign which has been tested in psychological studies on two-code signs, e.g. Koyuncu and Amado 2008. They are often seen on British roads, several more examples of frequent British traffic signs whose counterparts in other countries are typically used without any accompanying text are presented in Figure 4.

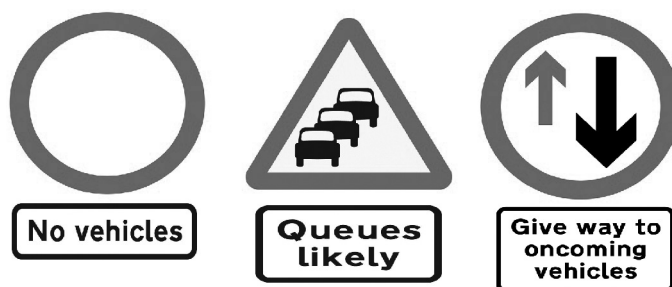


Figure 4: British signs with additional plates.

It may appear that a driver not able to read the text should not have any problems in comprehending the message expressed by signs of this type. However, the very presence of text may make such a driver unsure, as he or she is not able

¹ Obviously, it is also possible to have “translated signs” in the more traditional sense of the word, i.e. bilingual (or multilingual) signs in which the sense is expressed in two or even more different national languages. See Figure 10 later on as an example.

to determine the function played by the textual part and, consequently, does not know whether the meaning of the pictorial part has been modified or not.

Apart from translation, text in traffic signs can perform a number of other functions. Text can restrict the meaning of the picture, for example the French plate reading *PAR VERGLAS* placed under the circular white board with the red frame and *50* in the middle tells drivers that the speed limit of 50 km/h only applies when the road is icy.



Figure 5: A Dutch prohibition sign.

Similarly, in Figure 5 the text provides exceptions to the entry prohibition expressed by the pictorial part. Local traffic and buses are exempt from the prohibition. In both the cases, heeding to the pictorial part while disregarding (for example because of lack of comprehension) the textual part will not cause the driver to break the relevant regulation. The resulting behaviour (e.g. doing 50 km/h on a motorway in good weather and without heavy traffic) may, though, be unreasonable and sometimes even dangerous. Therefore, most foreign drivers would probably resort to observing local drivers and imitating their behaviour. If, in spite of the speed limit expressed by the sign described above, everybody is doing over 100 km/h, a foreign driver would be justified in assuming that the plate below the sign probably expresses an exception which applies at the moment (and it does, as it could be paraphrased as ‘except in any conditions other than icy road’).

Restricting the meaning of pictorial prohibitions by means of text, however, is less problematic for drivers not being able to understand the text than restricting the meaning of pictorial signs informing the driver that certain actions are allowed. Prominent examples of such two-code signs are parking signs, in

which the picture (if the white letter P in blue rectangle can actually be described as a picture) is very often accompanied by extensive textual information on the conditions governing the use of the parking space (times when it may be used, by whom, against payment, etc. – see Figure 6 as an example). Such signs are apt to cause confusion in drivers not able to read the text. The driver will not know whether he or she is allowed to use the parking space under present conditions. It is difficult to predict whether he or she will decide to park the vehicle there and on what factors the decision will be based.

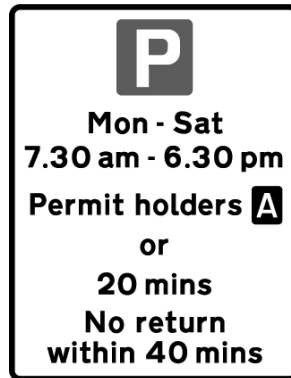


Figure 6: A typical British on-street parking sign.

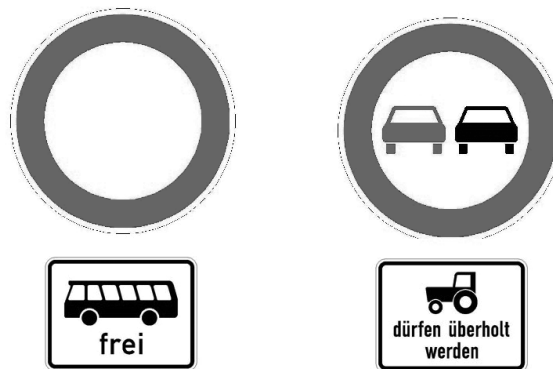


Figure 7: German prohibition signs with additional plates.

Text and picture can complement each other to create meaning in combination. For example, in the German plates in Figure 7 (themselves restricting the meaning of prohibitions, ‘no entry’ and ‘no overtaking’ respectively, expressed by pictorial signs) both parts are indispensable, as neither of them carries the

whole meaning of the plate. The pictorial part in each plate could easily be replaced by text. We could also imagine that the former plate could be replaced by a crossed-out picture of a bus, but the latter one is more problematic. The exceptions indicated by both the plates are different in character, “active” in the case of the former (buses, or rather their drivers, being the agents) and “passive” in the case of the latter (agricultural vehicles being the object of the activity, i.e. overtaking). Unlike in the case of meaning restrictions discussed above, if the driver disregarded the textual part, he or she would completely misunderstand the meaning of the signs interpreting the prohibitions as applying only to the type of vehicle presented in the picture. However, the driver should be able to notice that the picture is accompanied by some text even if this text is incomprehensible to him or her, and consequently may be expected to assume that the text somehow modifies the meaning of the picture. Therefore, the hypothesis may be put forward that in such a case the driver would rather disregard the plate as a whole, heeding to the prohibition sign above it, which would have the same consequences as described in the previous paragraph.

Another function of text included in traffic signs is to elaborate on the meaning of the picture it accompanies. Typical examples include the ‘other danger’ warning sign, which is normally supplemented with a plate specifying what kind of danger is to be expected. Figure 8 presents the sign in question plus a few typical German plates accompanying it (and included in the official list of signs). The plates may also come outside the official catalogue, as not all dangers are easily predictable by the lawmaker.

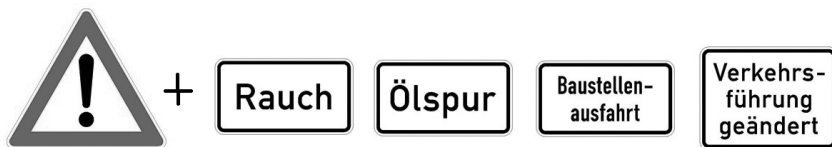


Figure 8: The German ‘other danger’ sign and some plates which may accompany it.

The pictorial part itself is not sufficient for the driver to obtain enough information to fully comprehend the sign. However, it can be reasonably expected that on seeing the ‘other danger’ sign while not being able to read the plate below it the driver would increase his or her vigilance in order to detect the danger and be able to modify his or her behaviour accordingly. If the hazardous factor is not recognized, the sign might upset the driver by causing uncertainty.

Text may also interpret the picture it accompanies, i.e. specify some conclusions to be drawn and actions to be taken. In Figure 9, the pictorial sign warning of a steep hill is combined with a plate telling the driver to engage a low gear. This advice on driving technique may in fact seem redundant, as a qualified driver should know that a lower gear will help prevent the vehicle from gaining speed too

rapidly while, at the same time, resulting engine braking will prevent the brakes from excessive heating. It is, however, only one of the methods of controlling speed, as the driver may additionally have to apply the foot brake at times, or turn on the retarder in a heavy vehicle. Interestingly, in Germany the equivalent sign typically appears without any plate, and, if employed, the plate reads *Abstand halten* ('keep distance'), sometimes also in languages other than German (English, Polish, Russian). Therefore, the German plate focuses on one of the desired effects (maintaining adequate headway from the previous vehicle) rather than an element of driving technique. Similarly, numerous British pictorial warning signs are often supplemented by the textual message *REDUCE SPEED NOW*.



Figure 9: The British 'steep hill' warning sign.

As already signalled on the basis of the example in Figure 1, one of the functions of text is to emphasise the message expressed by a pictorial sign without adding anything crucial to its meaning. Another example of this function is the table reading *RAPPEL* often accompanying French signs when they are repeated. As for comprehension of such signs, the same problem as mentioned in the case of intersemiotically translated signs also applies: the driver not able to read the text will be able to understand the meaning of the picture as such, but will not know whether and to what extent this meaning has been modified by text.

The function of text in traffic signs may sometimes also go far beyond the usual scope of regulating the road traffic. Alongside advertising billboards, shop signs, street names, descriptions on public buildings etc., textual traffic signs constitute a part of the "linguistic landscape" (see the definition provided by Landry and Bourhis 1997: 25), and they reflect "the ethnolinguistic vitality of different communities sharing a particular territory" (Jaworski and Thurlow 2010: 9-10). Therefore, the use of a particular language for traffic signs marks the territory where these signs are displayed as belonging to a particular ethnic group. This sense of territorial ownership is the main reason why ethnic minorities and cultural associations representing them insist that their languages should be used in traffic signs, even though the members of such minorities may well perfectly comprehend the dominant language (as is the case, for example, in Wales). On the other hand, the use of an additional language in traffic signs

may be motivated not only by the real need to make comprehension possible for foreigners, but also by the desire to make an area appear more cosmopolitan (for example, the use of English in tourist areas in non-English speaking countries). On the whole, the choice of language(s) to appear on traffic signs may constitute an important political and cultural message.



Figure 10: A bilingual French and Flemish road sign in Brussels.

The functions of picture towards text (in signs where text dominates, which are relatively less common) seem more limited than the functions of text. As already indicated when discussing the example in Figure 2, the main function may consist in attracting the driver's attention in a complex road environment. The shape and colour(s) of the board additionally help the driver to immediately assign the sign to a category and interpret it as an order (a prohibition or an instruction), a warning or an offer of information. These three categories of signs are illustrated, respectively, by examples from the UK in Figure 11.

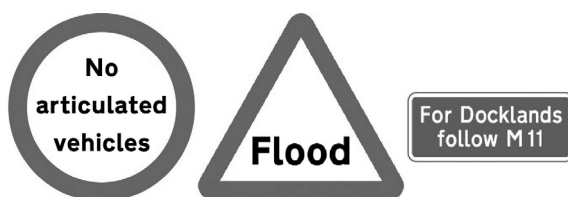


Figure 11: Signs of three different categories from the UK.

Traffic signs which can be considered as purely textual are rare, nowadays probably appearing only in the form of VMSs.

4. Conclusions

Many cognitive scientists (e.g. Edworthy and Adams 1996, Horberry et al. 2004) note that not all necessary road information can be represented by means of easily comprehensible pictorial signs:

[...] often there are situations in which text-based signs are essential (such as location names on indication signs). Thus, the authors are generally in favour of increased usage of symbolic traffic signs but slightly wary of attempts to symbolize almost everything. Well-designed textual signs can be useful in some situations, such as when precise numeric or instructional data are required or when a simple symbol cannot be identified. (Horberry et al. 2004:12)

The problem of text in traffic signs has, consequently, received much attention in psychological studies, but until now they have failed to recognize a wide range of roles the text may play and to investigate the problems of foreign drivers who either do not know the local language at all or speak it imperfectly. Most semioticians, on the other hand, treat traffic sign systems as if they were devoid of any verbal elements. A notable exception to this is Krampen 1983.



Figure 12: The newest addition to the Polish official list of road signs.

In 1980s, Krampen assumed, optimistically, that over time traffic signs would be simplified and the use of text in traffic signs as well as in other public signs would gradually be reduced and abandoned for the sake of international comprehensibility. In 2013, the trends look different. Many newly introduced traffic signs have textual elements in them. For example, the meaning of the newest Polish sign with the text *strefa ruchu* 'traffic zone' (Figure 12) is impossible to deduce on the basis of the accompanying picture, and even for a person who has got access to the text the meaning of the sign ('rules of the Law on Road Traffic apply also here') is hardly understandable unless checked in relevant regulations. Furthermore, although VMSs are able to display pictures as well, the new technology makes text more and more frequent. Respect for linguistic

diversity (sometimes misguided) results in an increase in bilingual and multilingual textual signs.

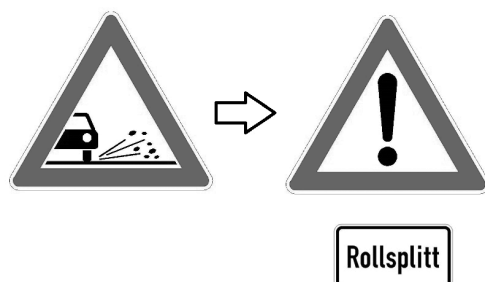


Figure 13: In 2009, the sign on the left was removed from the German official list of road signs.



Figure 14: A typical Polish on-street parking sign.

We can also observe how messages which actually can be expressed with pictures are expressed with text instead. Figure 13 shows an example from Germany, where the pictorial sign on the left has recently been replaced in the Traffic Code by the ‘other danger’ sign accompanied by the plate specifying, in the German language, the nature of the danger (‘loose gravel’). Figure 14 shows a Polish sign whose textual plate (‘only for passenger cars’) could easily be replaced by a plate showing a passenger car or a crossed-out truck and bus – neither of these plates, however, exists under the Polish Law on Road Traffic. Alternatively, and in accordance with the present regulations, the plate could be

replaced by a parking prohibition sign with a pictorial plate indicating it applies to trucks and buses.

Most EU countries are parties to the Vienna Convention on Road Signs and Signals of 1968. The Convention specifies that the system of signs and signals is based on graphic symbols rather than inscriptions. On the other hand, the Convention allows for adding textual information to pictorial signs “mainly in order to facilitate the interpretation of signs” on the condition that “this does not make the sign more difficult to understand for drivers who cannot understand the inscription”. Relations between text and image in traffic signs can be quite complex, as shown in the previous section, therefore I would argue that any inscription makes the sign more difficult to understand for drivers unable to comprehend the inscription, as they are not able to determine which function is played by the text (intersemiotic translation or emphasis versus some other functions, more salient for the meaning, such as restriction or elaboration).

As standardization of traffic signs by means of EU regulations is something to be expected in the next few years, efforts might be made on this occasion to eliminate text from those signs where it does not significantly contribute to the meaning. In addition, the new regulations should strive to replace text which does contribute to the overall meaning of the sign with pictures, which is often possible, as demonstrated in this section on the examples from Figures 13 and 14. Thirdly, the regulations need to reduce the amount of text displayed on VMSs and specify exactly which information can be displayed there in textual form and which is so important that it should only be displayed by means of pictorial signs (e.g. ‘accident ahead’, ‘traffic jam ahead’).

Numerous studies (e.g. Leviäkangas 1998 on Russians driving in Finland, Yannis et al. 2006 on foreigners of various nationalities driving in Greece) have shown that foreign drivers face a greater risk of accidents as compared with natives of the country in which they drive. The latter of the above-mentioned studies also suggests that this result is less pronounced for immigrants than for tourists. It is difficult to enumerate all the factors possibly contributing to this increased risk (such as a different “driving culture”, unfamiliar environment, etc.) and to determine what role is played by lack of knowledge of the local language. However, inability to comprehend textual elements in traffic signs definitely puts foreign drivers at a disadvantage and may well figure prominently among such factors.

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